BROOKHAVEN NATIONAL LABORATORY

Work Permit # DRL-2014-10/SS-2014
Work Order # ___
Job# ___ Activity# ___

See "Instructions for Filling out the Work Permit" contained in the Work Planning and Control for Experiments and Operations Subject Area.

1. Work request WCC fills out this section. ☐ **Standing Work Permit**

Requester: Don Lynch	Date: 6/27/2014	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Carter Biggs			Ext.: 7515
Work Control Coordinator: Don Lynch		Start Date: 7/7/2014	Est. End Date: 11/30/2014
Brief Description of Work: Troubleshooting and repairs to MuTr Station 1 South and North			
Building: 1008	Room: IR	Equipment: MuTr Station1 N & S	Service Provider MuTr Experts & PHENIX Techs

2. WCC, Requester/Designee, Service Provider, and ESS&H (as necessary) fill out this section or attach analysis

ESS&H ANALYSIS

Radiation Concerns	☒ None	☐ Activation	☐ Airborne	☐ Contamination	☐ Radiation	☐ NORM	☐ Other
☐ Special nuclear materials involved, notify Isotope Special Materials Group				☐ Fissionable/Radiological materials involved, notify Laboratory Nuclear Safety Officer		
Radiation Generating Devices:	☐ Radiography		☐ Moisture Density Gauges		☐ Soil Density Gauges	☐ X-ray Equipment

Safety and Security Concerns	☐ None	☐ Explosives	☐ Transport of Haz/Rad Material	☐ Pressurized Systems
☐ Adding/Removing Walls or Roofs	☐ Critical Lift	☐ Fumes/Mist/Dust*	☐ Magnetic Fields*	☐ Railroad Work
☐ Asbestos*	☐ Cryogenic	☐ Heat/Cold Stress	☐ Nanomaterials/particles*	☒ Rigging
☐ Beryllium*	☐ Electrical	☐ Hydraulic	☐ Noise*	☐ Silica*
☐ Biohazard*	☒ Elevated Work	☐ Lasers*	☐ Non-ionizing Radiation*	☐ Security Concerns
☐ Chemicals/Corrosives*	☐ Excavation	☐ Lead*	☐ Oxygen Deficiency*	☐ Suspect/Counterfeit Items
☐ Confined Space*	☐ Ergonomics*	☒ Material Handling	☐ Penetrating Fire Walls	☐ Vacuum
* Safety Health Rep. Review Required	☐ Haz, Rad, Bio Material Exceed DOE 151.1-C Levels - Contact OEM			☐ Other

Environmental Concerns	☒ None	☐ Work impacts Environmental Permit No.	
☐ Atmospheric Discharges (rad/non-rad)	☐ Land Use Institutional Controls	☐ Soil Activation/contamination	☐ Waste-Mixed
☐ Chemical or Rad Material Storage or Use	☐ Liquid Discharges	☐ Waste-Clean	☐ Waste-Radioactive
☐ Cesspools (UIC)	☐ Oil/PCB Management	☐ Waste-Hazardous	☐ Waste-Regulated Medical
☐ High water/power consumption	☐ Spill potential	☐ Waste-Industrial	☐ Underground Duct/Piping
Waste disposition by:			☐ Other
Pollution Prevention (P2)/Waste Minimization Opportunity:	☐ No ☐ Yes		

FACILITY CONCERNS	☒ None	☐ Intermittent Energy Release		
☐ Access/Egress Limitations	☐ Electrical Noise	☐ Potential to Cause a False Alarm		☐ Vibrations
	☐ Impacts Facility Use Agreement		☐ Temperature Change	☐ Other
☐ Configuration Management	☐ Maintenance Work on Ventilation Systems		☐ Utility Interruptions	

WORK CONTROLS

Work Practices

☐ None	☐ Exhaust Ventilation	☒ Lockout/Tagout	☐ Spill Containment	☐ Security (see Instruction Sheet)
☒ Back-up Person/Watch	☐ HP Coverage	☐ Posting/Warning Signs	☐ Time Limitation	☐ Other
☐ Barricades	☐ IH Survey	☒ Scaffolding-requires inspection	☐ Warning Alarm (i.e. "high level")	☐ Electrical Inspection Required

Personal Protective Equipment

☐ None	☐ Ear Plugs	☒ Gloves as appropriate	☐ Lab Coat	☒ Safety Glasses as appropriate
☐ Coveralls	☐ Ear Muffs	☐ Goggles	☐ Respirator*	☐ Safety Harness

☐ Disposable Clothing	☐ Face Shield	☐ Hard Hat	☐ Shoe Covers	☒ Safety Shoes	☐ High visibility cloths/vest	☐ Other

Permits Required (Permits must be valid when job is scheduled.)

☒ None	☐ Cutting/Welding	☐ Impair Fire Protection Systems
☐ Concrete/Masonry Penetration	☐ Digging/Core Drilling	☐ Rad Work Permit-RWP No
☐ Confined Space Entry	☐ Electrical Working Hot	☐ Other

Dosimetry/Monitoring

☒ None	☐ Heat Stress Monitor	☐ Real Time Monitor	☐ TLD
☐ Air Effluent	☐ Noise Survey/Dosimeter	☐ Self-reading Pencil Dosimeter	☐ Waste Characterization
☐ Ground Water	☐ O_2/Combustible Gas	☐ Self-reading Digital Dosimeter	☐ Other
☐ Liquid Effluent	☐ Passive Vapor Monitor	☐ Sorbent Tube/Filter Pump	

Training Requirements (List specific training requirements)

CA User, PHENIX Awareness

Based on analysis above, the Review Team determines the risk, complexity, and coordination ratings below:				**If using the permit when all hazard ratings are low, only the following need to sign: (Although allowed, there is no need to use back of form)**	
ESS&H Risk Level:	☒ Low	☐ Moderate	☐ High	WCC:	Date:
Complexity Level:	☒ Low	☐ Moderate	☐ High	Service Provider:	Date:
Work Coordination:	☐ Low	☒ Moderate	☐ High	Authorization to start	Date:
				(Department/Division, or their equivalent, Sup/WCC/Designee)	

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, scheduling, coordination, notifications, and personnel availability need to be addressed in adequate detail): See Attached
Special Working Conditions Required (e.g., Industrial Hygiene hold points or other monitoring) None
Notifications to operations and Operational Limits Requirements: None
Post Work Testing, Notification or Documentation Required:

Job Safety Analysis Required: ☐ Yes ☒ No	Review Done: ☒ in series ☐ team

Reviewed by: * Primary Reviewer signature means that the Review Team members were appropriate for the work that was planned, the Team visited the job site, hazards and risks that could impact ESS&H have been considered and controls established according to BNL requirements. In addition, this signature indicates that applicable JRAs, FRAs, as well as other planning documents have been reviewed and training requirements have been identified and recorded on this permit.

Title	Name (print)	Signature	Life #	Date
ES&H Professional				
F&O Facility Project Manager				
Service Provider				
Work Control Coordinator	Don Lynch		20146	
Safety Health Representative				
Research Space Manager				
Other				
Other (PHENIX Escort)				
Required Walkdown Completed				
*Primary Reviewer				

4. Job site personnel (Supervisor and workers) fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments) and all training required for this permit is current/complete. Job Supervisor/Contractor Supervisor signatures also includes verification that worker training required for this permit is current/complete.

Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:

Workers are encouraged to provide feedback on ESS&H concerns or on ideas for improved job work flow. Use feedback form or space below.

5. Department/Division, or their equivalent, Line Manager or Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)

Name:	Signature:	Life#:	Date:

6. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)

a) WCM/WCC: Are there any changes as a result of worker feedback? ☐ Yes ☐ No

Note: See Work Planning and Control for Experiments and Operations Subject Area section 2.6.

7. Post Job Review/Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of job site to work supervisor.) The WCC ensures that the change process to update drawings, placards, postings, procedures, etc., is initiated, if necessary.

Name:	Signature:	Life#:	Date:
Comments:			

Work plan Attachment **WP# DRL-2014-10/SS-2013-**

MuTr Station 1 & 2 South Troubleshooting & Repair

INTRODUCTION

During Run 14 a few problems have been encountered with Muon Tracker (MuTr) station1 detector modules. These problems have been isolated to specific MuTr 1 Front End Electronics components in the station 1 north and south areas. In order to address these problems, troubleshooting, testing and repairs need to be made at the sources in the station 1 north and south gaps. Access to the electronics components in these areas require custom scaffolding, which PHENIX engineering has designed, Collider Accelerator (C-A) department engineering has reviewed and approved and PHENIX technical support staff has successfully constructed and used several times during the previous few shutdowns.

The actual troubleshooting and repairs are worker planned work to be performed by MuTr experts.

Procedure

All tasks described herein are to be performed by PHENIX technicians, BNL bargaining unit carpenters and/or MuTr experts. All personnel shall have appropriate training to perform each of the tasks described, in the manner described.

1) After the Muon Magnet South (MMS) and Central Magnet (CM) have been separated by moving the MMS to its south most position in accordance with the PHENIX procedure PP-2.5.5.1-01-C to gain access to South Station1 of the MuTr, PHENIX technicians and BNL bargaining unit carpenters shall erect the Station 1 scaffolding per the attached drawing # 105-0500-092-A. ***Note: A copy of the attached agreement between PHENIX and the IBEW (attached) allowing PHENIX Techs to work cooperatively with IBEW carpenters to erect the scaffolding described herein shall be prominently posted at the worksite along with a copy of this work permit.***

2) After the scaffolding is erected, it shall be inspected by a qualified scaffold inspector prior to use for any purpose, and the attached scaffold inspection check sheet (or appropriate check list card) shall be filled out and signed by the inspector.

3) The inspector shall attach the scaffold check list to the scaffold indicating its suitability for use.

4) The scaffold shall be inspected daily by a qualified person before use. The scaffold check list attached to the scaffold may be used to record the inspection date and approval.

5) After any changes are made to the scaffolding, the check list must be removed and the scaffold re-inspected by a qualified scaffold inspector and items 2 and 3 above repeated.

This scaffolding shall be used for the MuTr work described above, but it may also be used for RPC1, BBC, MPC and MPC-Ex work in station 1 south during the 2014 shutdown. Work for those subsystems shall be planned and documented separately, except that the scaffold use documentation described herein shall suffice for all of these projects. Work planning for those projects shall reference this work permit to describe scaffold work planning.

6) When work has been completed in station 1 south the scaffolding shall be disassembled and removed from station 1 south to allow repositioning of the CM magnet.

7) With the Muon Magnet South (MMS) in its southmost position The CM magnet shall be moved south in accordance with PHENIX procedure PP-2.5.5.1-01-C to open access to MuTr Station 1 North.

8) Steps 1 thru 6 above shall be followed to erect, inspect and modify the station 1 scaffolding as necessary to accomplish MuTr work described above.

This scaffolding shall be used for the MuTr work described above, but it may also be used for RPC1, BBC, MPC and MPC-Ex work in station 1 north during the 2014 shutdown. Work for those subsystems shall be planned and documented separately, except that the scaffold use documentation described herein shall suffice for all of these projects. Work planning for those projects shall reference this work permit to describe scaffold work planning.

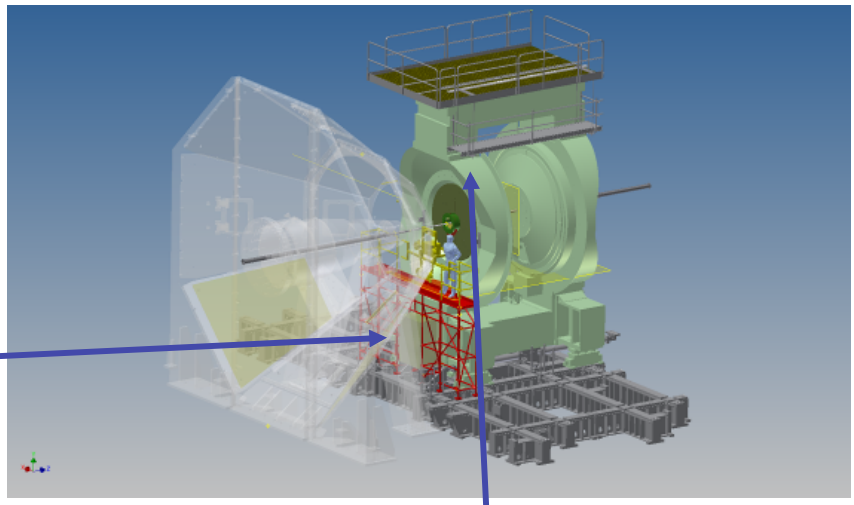
After completion of all work requiring the use of the station 1 scaffolding, the scaffolding shall be disassembled and stored in its storage container whivch shall be suitably stowed to protect against damage and/or deterioration until it is next needed.

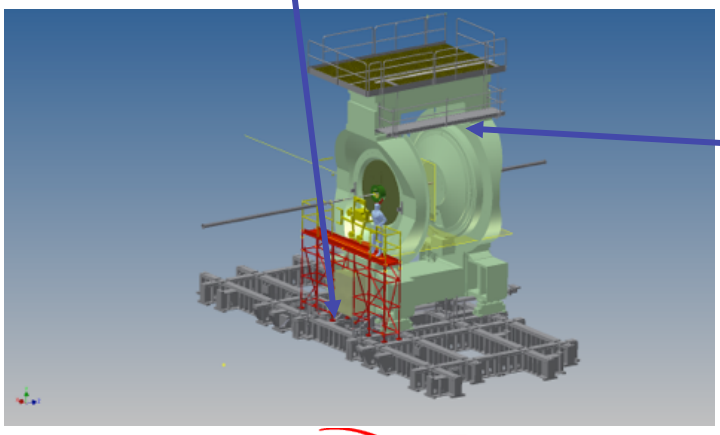
Work Permit Closeout

After all work under this permit has been completed, this work permit shall be closed. Any "lessons learned" during tenure of this work permit shall be recorded on the permit and disseminated to appropriate personnel.

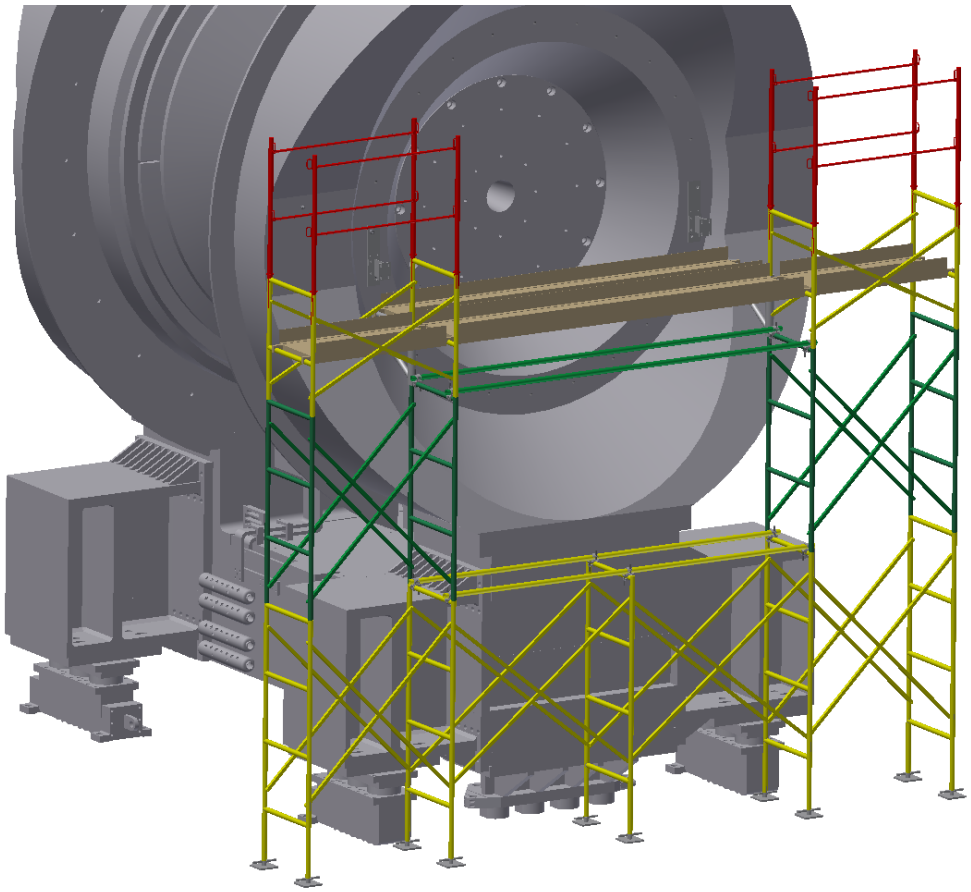
MuTr Station 1 Troubleshooting, Maintenance and Repair During Shutdown 2014

Station 1 platform configured for lower level access shown with North Muon Magnet in phantom for reference and invisible for clarity.





Central Magnet suspended work platform also shown in both models, but not needed for 2014 shutdown.



SAFWAY Scaffolding arrangement for upper access. Ladder and MMN not shown for clarity.

Configuration required for space between CM and MMS is similar.

Muon Tracker Shutdown Work List – summer 2014

- testing as MPC-EX installed, particularly before closing Sta-1's
- fix packets that were disabled for Run14
  - 11035,36 – South Sta-1 Quad-4 Chassis-3
- replace boards for most frequent FEM problems from run
  - 11195 - North Sta-1 Quad-3 Chassis-3?
    - might have already done this; check history (changed RX 3/14/12)

2014 planned Technical Support & 2014 Shutdown

Support for run 14	2/3-6/30/2014
Procure & Fabricate parts for MPC-Ex North and South	1/1/2014-6/30/2014
Set up Physics lab for FVTX/VTX east	6/15/2014
End of Run Party	6/27/2014
MuID Efficiency Measurement (Itaru, requires cooling water & isobutane)	7/7-7/10/2014
Start of Shutdown Tasks (purge flammable gas, disassemble and stow shield wall, remove collars, move EC to AH, Move MMS south, etc.)	**7/14 – 7/25/2014**
Remove FVTX/VTX East to PHYSICS?, repair and reinstall	7/14 – 9/15/2014
Remove MMS east vertical lampshade	7/28-7/30/2014
Troubleshoot intermittent water leak in MMS	7/30- 8/8/2014
Other Maint. In MMS	TBD
Reinstall MMS east vertical lampshade	TBD
Summer Sunday prep AH, tours and restore AH	7/30-8/15/2014
Install scaffolding in Sta 1 South	**7/28/2014**
Remove MPC-Ex prototype	7/28-8/1/2014
MuTr Sta 1 South troubleshooting and repairs	**7/28-8/1/2014**
Maint. & Repairs for MPC South, BBC South, RPC1 South1	7/28-8/1/2014
Assemble & test MPC-Ex North, ready for installation	8/1-9/5/2014
Remove scaffolding from sta 1 south, Move CM South	**8/4-8/5/2014**
Install scaffolding in Sta 1 North	**8/6-8/8/2014**
MuTr Sta 1 & Sta. North troubleshooting and repairs	**8/11-9/5/2014**
Prep MPC-Ex North installation area	8/11-9/5/2014
Install new MPC-Ex North	9/8-9/26/2014
Assemble & test MPC-Ex South, ready for installation	9/2-10/3/2014

Items in Red pertain to MuTr Sta 1 N & S work during the 2014 shutdown

2014 planned Technical Support & 2014 Shutdown (cont'd)

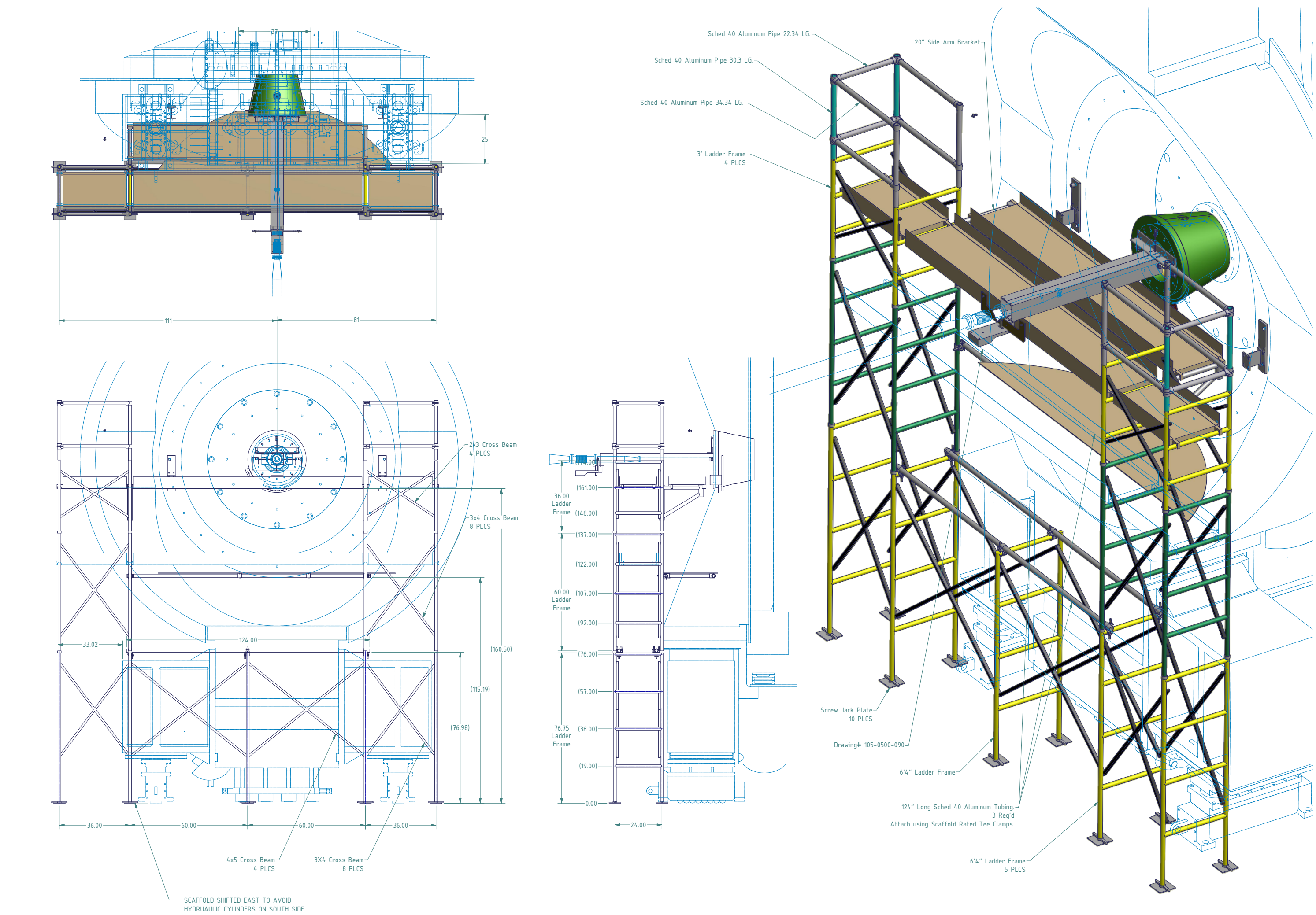
Remove Sta 1 N scaffolds, Move CM North, Install scaffolding in Sta 1 S	9/29-10/3/2014
Install MPC-Ex South	10/6-10/24/2014
Remove Sta 1 S scaffolding	10/27-10/31
Other detector support	TBD
Infrastructure Maintenance and Improvement	TBD
Decommissioning of obsolete PHENIX detector equipment	TBD
sPHENIX Support	on-going
End of Shutdown Tasks (Move MMS north, roll in EC , install collars, remove 10 ton cart, plates and manlifts, build shield wall, etc.)	10/27-11/26/2014
DC East & West maintenance & repairs	11/17-12/5
Pink/White/Blue Sheets	12/1-12/19/2014
End of Shutdown Party	????
Start Flammable gas flow	????
Close shield wall, install radiation interlocks and prepare for run 14	12/31/2014
Start run 15	1/2/2015

Items in Red pertain to MuTr Sta 1 N & S work during the 2014 shutdown

REV	DESCRIPTION	DATE	APPROVED
A			

REVISION HISTORY

NOTES:



PRELIMINARY

			REV
			SHEET

REVISION STATUS OF SHEETS

THIRD ANGLE PROJECTION

INTERPRET IN GENERAL ACCORDANCE WITH ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN MILLIMETERS DECIMAL TOLERANCES
XX ± 0.06
X.XX ± 0.02
X.XXX ± 0.005
ANGLES ± 0.5

125 FINISH | BREAK EDGES: MAX. 0.015 MIN. 0.005

NEXT ASSEMBLY

DRAWN BY:	RUGGIERO	10/4/2007
CHECKED BY:	D. LYNCH	10/4/2007
ENGINEER APPROVAL:		10/4/2007
Q.A. APPROVAL:		10/4/2007
SAFETY ENGINEER:		10/4/2007

BROOKHAVEN NATIONAL LABORATORY
Upton, NY 11973

PROJECT: PHENIX
SYSTEM: System Engineering and Integration
MODEL/DRAWING NAME: Station 1 Safway Scaffold Assembly

SIZE: E | DRAWING NUMBER: 105-0500-092 | REV. A

Q.A. CATEGORY: A3 | SCALE: 1/8 | WEIGHT: | SHEET 1 OF 1

Human Resources Division

BROOKHAVEN
NATIONAL LABORATORY

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managed by Brookhaven Science Associates
for the U.S. Department of Energy

date: July 1, 2014

to: E. O'Brien, P. Pizzo

from: Ernest L. Tucker

subject: Scaffolding in support of the PHENIX detector

The staff assigned to the PHENIX Experiment, are required to perform work on the detector. The work will require the installation of scaffolding within the detector as well as outside of it. The following is a summary of the agreement made between the IBEW and PHENIX regarding the installation and removal of the scaffolding in support of the project.

- A PHENIX technician and an IBEW carpenter will cooperate to erect, modify, disassemble and re-erect scaffolding in the station 1 north and south area of the PHENIX IR in close proximity to various PHENIX detector systems and the PHENIX Beryllium beam pipe system, inside the north and south magnets, and between the CM and the DC west detector.
- An IBEW carpenter will be present while PHENIX technician performs work and vice versa. The absence of a carpenter for breaks, lunch, and other short periods will not impede the work of the PHENIX technician as long as an IBEW carpenter is assigned to this project.
- The scaffolding will be modified to change platform elevation several times and will be moved from the North Station 1 to South Station 1 during the project. For each change an IBEW carpenter will be assigned to work with a PHENIX technician. If determined to be necessary, attachment of the scaffolding to the PHENIX decking will be performed by an IBEW carpenter.
- IBEW carpenter will fabricate all custom scaffold parts as needed.
- This agreement will be posted on Job site.

This agreement pertains to the particular job in question and is not in effect for future work nor does it apply to work on other detectors within RHIC. Future activities of this nature will have to be discussed and agreed upon by both parties before work can commence. Please distribute this information to all appropriate personnel.

Regards,

Ernest L. Tucker

Ernest L. Tucker
Labor Relations Business Partner

cc: D. Allshouse, D. Lynch, D. Tarrant